NEES Earthquake Engineering Research Equipment, Phase 2

George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES)

Program Solicitation

NSF-01-164

DIVISION OF CIVIL AND MECHANICAL SYSTEMS

LETTER OF INTENT DUE DATE(S) (*required*): December 31, 2001

FULL PROPOSAL DEADLINE(S): January 30, 2002

NATIONAL SCIENCE FOUNDATION

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Web Site at:

http://www.nsf.gov

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information (NSF Information Center):** (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

  Send an e-mail to: pubs@nsf.gov

  or telephone: (301) 947-2722

- **To Locate NSF Employees:** (703) 292-5111

SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: NEES Earthquake Engineering Research Equipment, Phase 2

Synopsis of Program:

The George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) supports collaboration in earthquake engineering research and education through the development of a national, networked simulation resource of geographically distributed, shared-use, next generation experimental research equipment installations, curated data repository, and access to leading edge computational resources. NEES will become operational by September 30, 2004, and operate for ten years under a NEES Consortium. NEES is developing through a series of solicitations. This solicitation, "NEES Earthquake Engineering Research Equipment, Phase 2," requests proposals to complete the NEES research equipment portfolio that was started as Phase 1 under an earlier solicitation, NSF 00-6, "NEES: Earthquake Engineering Research Equipment."

Cognizant Program Officer(s):

- Dr. Joy M. Pauschke, George E. Brown, Jr. Network for Earthquake Engineering Simulation, Program Director, Engineering (ENG), Civil and Mechanical Systems (CMS), Room 545, telephone: (703) 292-7024, e-mail: nees@nsf.gov.

- Dr. Thomas L. Anderson, George E. Brown, Jr. Network for Earthquake Engineering Simulation, Program Director and NEES Equipment Project Coordinator, Engineering (ENG), Civil and Mechanical Systems (CMS), Room 545, telephone: (703) 292-4477, e-mail: nees@nsf.gov.

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.041 --- Engineering

ELIGIBILITY INFORMATION

- **Organization Limit:**

  U.S. universities and colleges may submit proposals as the host institution. The submitting institution must have a graduate degree program in civil engineering involved in the conduct of earthquake engineering research.

Collaborative proposals involving more than one organization must be submitted as a single administrative package from the host institution. The host institution is responsible for the design, procurement, construction, installation, commission, and operation of the

NEES equipment and for all interactions with the NSF.

A "host site" is defined as a field installation that is not located at the submitting institution. For such installations the submitting institution will be considered as the "host" institution.

The host institution and, if necessary, the host site must:

- Describe and allocate space on its campus/site for the housing, storage, and operation of NEES equipment.
- Commit to providing the network infrastructure outlined in the Program Description section of this solicitation by September 30, 2004 and agree to maintain the infrastructure through September 30, 2014.
- Provide access to a high performance network, such as vBNS (or its successor(s)), Abilene, or others, through September 30, 2014.

- **PI Eligibility Limit:** The principal investigator must be a full-time faculty member in the College or School of Engineering at the submitting institution.
- **Limit on Number of Proposals:** None

AWARD INFORMATION

- **Anticipated Type of Award:** Cooperative Agreement
- **Estimated Number of Awards:** Up to 10 awards, subject to the quality of proposals and the availability of funds.
- **Anticipated Funding Amount:** About $15-20 million, subject to the quality of proposals and the availability of funds.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full program announcement/solicitation for further information.

Full Proposals: Supplemental Preparation Guidelines

- The program announcement/solicitation contains supplements to the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full program announcement/solicitation for further information.

C. Deadline/Target Dates

- **Letters of Intent (*required*):** December 31, 2001
- **Preliminary Proposals (*optional*):** None
- **Full Proposal Deadline Date(s):** January 30, 2002

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
    - Kimberly Bryant, NEES Fastlane Coordinator, ENG/CMS, Division of Civil and Mechanical Systems (CMS), Room 545, telephone: (703) 292-7006, e-mail: kbryant@nsf.gov.
    - FastLane User Support, IRM/DIS, Division of Information Services, telephone: 800-673-6188, e-mail: fastlane@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full program announcement/solicitation for further information.

I. INTRODUCTION

About NEES

The George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) will provide a national resource that will shift the emphasis of earthquake engineering research from current reliance on physical testing to integrated experimentation, computation, theory, databases, and model-based simulation. As a national resource, NEES will:

- Include approximately 20 major earthquake engineering experimental research equipment installations networked through the high performance Internet. [Initially through 2004, NEES will include equipment sites funded through NSF program solicitations. NSF envisions, however, that other globally significant earthquake engineering equipment sites will participate in NEES and bring unique experimental capabilities to NEES.]
- Be developed by September 30, 2004.
- Be operational through September 30, 2014.
- Improve the seismic design and performance of our Nation's civil and mechanical infrastructure systems.
- Use advanced experimental and simulation capabilities to test and validate more complex and comprehensive analytical and computer numerical models.
- Provide end-to-end system connectivity to operate distributed experimental research equipment, including teleobservation and teleoperation, and to enable computation and distributed simulation for earthquake engineering experimentation.
- Provide researchers with remote access to a curated repository of databases, user-developed simulation software, and models for use in model-based simulation and visualization through access to a computational grid.
- Form an integrated network that facilitates interdisciplinary global collaboration among scientists and engineers.
- Enable participation from a broader earthquake engineering community, including educators, students, practitioners, and public sector organizations and individuals, who will have access to the equipment, data, models and software from NEES.

Additional sources for NEES information

NEES is developing through a series of program solicitations. This solicitation, "NEES Earthquake Engineering Research Equipment, Phase 2," requests proposals to complete the NEES research equipment portfolio that was initially funded as Phase 1 under program solicitation NSF 00-6. All equipment developed under this Phase 2 solicitation must be operational by September 30, 2004. Proposers to this solicitation should review previous NSF NEES solicitations, i.e., NSF 00-6, NSF 00-7, and NSF 01-56, for NEES programmatic vision, scope, and concepts. The NSF NEES website, http://www.eng.nsf.gov/nees, provides links to workshop reports, lists of Frequently Asked Questions (FAQ), and other documents that chart the development progress of and awards made under NEES.

Previous NEES program solicitations include:

- *NSF 00-6, Network for Earthquake Engineering Simulation (NEES): Earthquake Engineering Research Equipment*
    - Document URL: http://www.nsf.gov/cgi-bin/getpub?nsf006
    - Issued: December 1999.
    - Focus: Establishment of the Phase 1 NEES Earthquake Engineering Research Equipment Portfolio through construction, expansion, and modernization of the Nation's earthquake engineering experimental facilities.
    - Award information, listing shake tables, geotechnical centrifuges, a tsunami wave basin, large-scale laboratory experimentation systems, and field installations and monitoring equipment: http://www.eng.nsf.gov/nees/Awards/awards.htm.
- *NSF 00-7: Network for Earthquake Engineering Simulation (NEES): System Integration*
    - Document URL: http://www.nsf.gov/cgi-bin/getpub?nsf007
    - Issued: December 1999.
    - Focus: Development of the high performance Internet network system for NEES.
    - Award information: One scoping study award was made in August 2000 and completed in February 2001. Information on the scoping study award and its activities are available at http://www.neesgrid.org. The scoping study awardee conducted an earthquake engineering community workshop in Marina del Rey, CA, on November 16 and 17, 2000, to gain community input for the NEES network system design. A report from this workshop will be posted on the NEESgrid website at http://www.neesgrid.org when it becomes available. One award for system integration was made in August 2001 and its activities are available at http://www.eng.nsf.gov/nees/Awards/awards.htm and http://www.neesgrid.org.
- *NSF 01-56, George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES): Consortium Development*
    - Document URL: http://www.nsf.gov/cgi-bin/getpub?nsf0156
    - Issued: January 2001.
    - Focus: Three tasks: (1) development of the NEES Consortium on or before October 1, 2003, to operate NEES from October 1, 2004, through September 30, 2014; (2) facilitation of earthquake engineering community input for design of the NEES network system; and (3) coordination of outreach and training activities for the NEES equipment sites as they become operational before September 30, 2004.
    - Award information: One award is anticipated to be made on or before October 1, 2001. When available, information about this award may be found at http://www.eng.nsf.gov/nees/Awards/awards.htm.

II. PROGRAM DESCRIPTION

Overview

This solicitation requests proposals to complete the Nation's NEES equipment infrastructure portfolio by investing in the design, procurement, construction, installation, commissioning, and operation of unique new and upgraded experimental earthquake engineering research equipment sites that bring next-generation experimental capabilities, instrumentation, and research and education opportunities to the earthquake engineering community.

Requirements of a NEES Phase 2 Equipment Site

An earthquake engineering equipment site in NEES, Phase 2, must:

- Have a compelling national research vision for integrated, shared-use experimentation that can lead to significant advances in the seismic design and performance of our Nation's civil and mechanical infrastructure systems.

- Respond to testing and validation needs identified by the broader earthquake engineering community that cannot be met with NEES Equipment Phase 1 facilities.

- Support the development of improved and more comprehensive analytical or numerical modeling and simulation tools.

- Be operational by September 30, 2004. An aggressive design, procurement, construction and commissioning schedule must be developed and described in the proposal that meets this operational completion date.

- Provide national, shared-use access to the NEES infrastructure by the broader earthquake engineering research community through September 30, 2014.

A NEES site must commit to the development of the following infrastructure:

- Facilities for housing and operating the NEES equipment in a research-intensive, collaborative learning environment.

- NEES equipment that:

- Provides advanced, innovative, or otherwise unique equipment that allows advances and innovations in experimental earthquake engineering research.

- Is designed, selected, installed, and operated to:

- Minimize operating costs.

- Provide for the effective implementation of teleobservation and teleoperation.

- Provides a comprehensive data acquisition system to support validation of analytical and computer numerical models for model-based simulation and visualization that integrate knowledge gained through experimental and analytical research.

- Is located at the submitting or "host" academic institution (except for field installations) and the host institution will be the "host site" for the NEES equipment.
- Complements equipment facilities developed under the NEES Equipment Phase 1 competition.
- A network that includes:
- Connections to the NEES network system.
- Access to a high performance network such as vBNS (or its successor(s)), Abilene, or others.
- Capabilities for teleobservation and teleoperation of the NEES equipment for users outside the host institution.
- A web site for the information and training for outside users.
- Policies and plans that address:
- Performance standards for construction quality, schedule, and cost control.
    - The implementation of a high performance connection from the equipment to the host institution's high performance Internet connection. For field installations, alternative connections from the equipment to an existing high performance network must be explicitly proposed.
    - Management and organization structure that includes:
    - A project manager responsible for day-to-day management of the design, procurement, construction, installation, commissioning and operation of the NEES equipment through September 30, 2004.
    - An external advisory committee that ensures technical quality, relevance, and usability of the NEES equipment.
    - Communications with all subawardees, suppliers, contractors, consultants, and other NEES equipment awardees.
    - Diversity on the project team with respect to under-represented groups in engineering and other disciplines.
    - Participation in outreach and training activities developed by the NEES Consortium Development awardee and NEES Consortium.
    - Documenting and reporting annual operating costs to NSF through September 30, 2004.

- Working closely with the NEES System Integration Awardee funded under program solicitation NSF 00-7, "NEES: System Integration," the NEES Consortium Development awardee funded under program solicitation NSF 01-56, "NEES: Consortium Development," and participating in activities of the NEES Consortium, when established, through September 30, 2014, to facilitate the:
    - Interconnection of all NEES equipment installations.
    - Development of national NEES network system.
    - Development and implementation of NEES data protocols.
    - Rapid response to requests for information needed by NSF.
    - Establishment of the networking infrastructure.
    - Integrated management and shared-use access of all NEES equipment by the Consortium through September 30, 2014, in accordance with policies to be established by the NEES Consortium.

Teleobservation, Teleoperation, and Shared Use Requirements

To foster the teleobservation, teleoperation and shared use capabilities of the NEES equipment, NEES equipment awardees will work with the NEES Consortium Development awardee (through September 30, 2004) and the NEES Consortium (October 1, 2004 - September 30, 2014) to develop activities to train the earthquake engineering community on use of the equipment.

Host Site Requirements

If a field installation will not be located at the submitting institution, then the proposal must describe the off-campus "host site" where the equipment will be located. The submitting institution will be considered as the "host" institution. For proposed field installations, the proposal must describe the relationship of the requested NEES equipment, the location of earthquake sensors and the data processing/management strategy through 2014 relative to the U.S.Geologic Survey Advanced National Seismic System, http://www.anss.org, or other operating seismic networks, where applicable**.**

For equipment such as field installations that cannot be located at the host institution, NSF expects that use of this equipment and the derived data will be integrated into the research and educational activities at the host institution.

NSF Plan for Networking NEES Sites

NSF plans to set aside supplemental funds for networking the awarded NEES equipment sites after the overall NEES network system is designed by the NEES System Integration awardee (NSF 00-7) and approved by NSF. The NEES System Integration awardee will work with NEES equipment awardees to develop and implement the networking concept for the system. The System Integration awardee may specify site-specific hardware and software necessary for local networking to achieve the goal of NEES for networking each NEES equipment site with the NEES system. This may include site-specific local networking equipment such as workstations dedicated to networking, specialized processors, NEES equipment interfaces, local area networking within the NEES equipment installation, the installation's interface with the host institution, and the host institution's high performance interface to the Internet. NSF may support such equipment for use specifically for the NEES Program as subsequent supplements to the NEES equipment awards. Therefore, site-specific local networking equipment should not be included as a budget item on NSF budget form under the proposal section "Budget" or in Appendix 4 of the proposal. Rather, concepts and detailed cost estimates for local networking equipment must be provided in Appendix 2 of the proposal as an information item. The host institution's or host site's access to a high performance network is not an eligible project cost under this solicitation; such access must be provided by the host institution as a condition of an award.

Additional Guidance for Phase 2 proposals

NSF sponsored a workshop at the University of California, San Diego (UCSD), on May 14-15, 2001, that focused on an assessment and completion of the NEES earthquake engineering research equipment portfolio. The workshop report, on the UCSD website at http://nees.ucsd.edu/, suggests a list of six likely areas where knowledge gaps exist and where innovative earthquake engineering research equipment and research approaches are needed to advance the state-of-the-art. The list of equipment and research needs in that workshop report are suggestions for proposers to this solicitation and should not be considered as all-inclusive. Furthermore, the UCSD workshop report contains recommended strategies to maximize shared-use of NEES equipment and sites, aimed at ensuring that NEES is a successful national collaborative shared-use resource to the broader earthquake engineering research community.

A *Directory of Earthquake Engineering Experimental Facilities* is being assembled under NSF sponsorship. This directory will identify major world-wide earthquake engineering experimental research facilities in the categories of shake table, strong floor/reaction wall, geotechnical centrifuge, tsunami wave basin, and field equipment facilities located world wide. The report will be posted on the NSF NEES website at http://www.eng.nsf.gov/nees in the fall of 2001.

Award Oversight

Awards under this solicitation will be by cooperative agreement. NSF may conduct site visits to review the progress, plans, management, and project execution of cooperative agreement awardees. The NSF site visit team will consist of NSF staff and may be supplemented by experts from the earthquake engineering research community, the construction industry, and other fields as appropriate.

III. ELIGIBILITY INFORMATION

U.S. universities and colleges may submit proposals as the host institution. The submitting institution must have a graduate program in civil engineering involved in the conduct of earthquake engineering research.

Collaborative proposals involving more than one organization must be submitted as a single administrative package from the host institution. The host institution is responsible for the design, procurement, construction, installation, commission, and operation of the NEES equipment and for all interactions with the NSF.

A "host site" is defined as a field installation that is not located at the submitting institution. For such installations the submitting institution will be considered as the "host" institution.

The host institution and, if necessary, the host site must:

- Describe and allocate space on its campus/site for the housing, storage, and operation of NEES equipment.
- Commit to providing the network infrastructure outlined in Program Description section of this solicitation by September 30, 2004 and agree to maintain the infrastructure through September 30, 2014.

- Provide access to a high performance network, such as vBNS (or its successor(s)), Abilene, or others, through September 30, 2014.

The principal investigator must be a full-time faculty member in the college of engineering at the submitting institution.

IV. AWARD INFORMATION

Anticipated date of awards: July-October, 2002.
Award duration: Award date through September 30, 2004.

Eligible project costs requested from NSF through September 30, 2004, under this solicitation include:

- Support for the design, procurement, construction, installation, commissioning and operation of NEES research equipment (either purchased from a manufacturer or constructed at the site).
- Upgrading existing equipment.
- Instrumentation and data acquisition systems.
- Operating costs.
- Design, materials, construction, installation and any other costs for physical test specimens provided they are directly related to commissioning and performance evaluation of the NEES equipment.
- Costs for on-site assembly of multi-component equipment.
- Specialized safety equipment when necessary for the safe utilization of the requested equipment.
- Specialized equipment and software needed to facilitate teleobservation and teleoperation.
- A project manager who will be responsible for the overall project and day-to-day project execution. Requests for personnel costs, such as for the project manager, faculty, technical staff, students, and postdoctoral research associates, must include a description of the responsibilities, tasks, and specific project deliverables of each person on the project to justify salary requests.
- Travel by the principal investigator to two NSF NEES awardee meetings per year.
- Travel costs for External Advisory Committee members.
- Design of user/training manuals and website for remote users.

Costs not allowable under this solicitation include:

- Direct costs for renovation, modification, or new construction of laboratories or other buildings.

- General-purpose office equipment.
- Support for curriculum development.
- Site-specific networking equipment (see Program Description section of this Solicitation for detailed NSF plans for networking).
- Connectivity for the host institution or host site for access to a high performance network.
- Secretarial or clerical support.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Letters of Intent:

The mandatory letters of intent must be submitted by authorized organizational representatives of U.S. universities or colleges on behalf of principal investigators via e-mail to nees@nsf.gov by December 31, 2001. Submit a separate letter of intent for each proposal planned by the institution with respect to this solicitation. The letter of intent should include:

- Title of proposal.
- The names and affiliations of the principal investigator and co-principal investigator(s).
- The telephone and facsimile numbers and e-mail addresses of the principal investigator and an authorized organizational representative of the submitting institution.
- A list of all participating institutions and organizations, including contact information/people/addresses.
- A brief description (500 words or less) of the requested NEES equipment.

Letters of intent will not be evaluated or used to decide on funding. The submission of letters of intent enables NSF to begin organization of the review process before the proposal submission deadline. NSF will acknowledge the receipt of all letters of intent via e-mail to the principal investigator and the authorized organizational representative. **NSF will not accept proposals that do not have corresponding letters of intent submitted by the due date.**

Full Proposal:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Web Site at: http://www.nsf.gov/cgi-bin/getpub?gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

Besides the instructions in the GPG, proposals must be prepared in accordance with the supplemental instructions in this solicitation.

All proposals to NSF are required to be submitted completely electronically through FastLane, eliminating the requirement that all identified PIs and Co-PIs sign the proposal Cover Sheet, eliminating the requirement to submit a signed paper proposal Cover Sheet, removing the requirement that subawardee organizations provide signed budgets, and other changes as described in the NSF Grant Proposal Guide (GPG) (NSF 01-2).

Proposers must identify this program solicitation number (NSF 01-164) in the 'program announcement/solicitation' block on the NSF Form 1207, "Cover Sheet for Proposal to National Science Foundation." On this same form the 'For Consideration by NSF Organization Unit' block must be "Network for Earthquake Engineering Simulation."

The Project Description section (GPG, NSF 01-2, Chapter II.C.3) must not exceed 40 pages and **must use the International System of Units (SI) only.** Figures, including charts, graphs, maps, photographs, and other pictorial representations are included in this 40-page limit. Non-conforming proposals will be returned without review. References cited, budget, current and pending support, biographical sketches, and Appendices 1 – 4 are not included in this page limit. The page limit for each appendix is listed in the description of that appendix. Please note that the page limits specified in this solicitation takes precedence over those given in the GPG.

Proposers to this solicitation may wish to import graphics. Proposers should be aware of file formats that are compatible for FastLane proposal submissions. The file formats can be found at the FastLane website, http://www.fastlane.nsf.gov/a1/A1AcceptableFileExtensions.html

Proposers are asked to submit a number of documents such as, for example, four appendices, letters and inspection report, where applicable. These supporting documents should be included in the Supplementary Documents section within FastLane.

1. Project Summary (GPG, NSF 01-2, Chapter II.C.1), not more than one page in length. The project summary should serve as an "Executive Summary" and include the research vision, rationale for the equipment, description and capabilities of the equipment, location of the equipment, and impact of the equipment on the host institution and on earthquake engineering research. Key aspects of both NSF merit review criteria (see Section VI.A., NSF Proposal Review Process) should be inclcuded. A scientifically literate reader should be able to understand the summary. The Project Summary is not part of the Project Description page limit. **Use SI units only.**

2. Table of Contents (GPG, NSF 01-2, Chapter II.C.2).

3. Project Description/Project Execution Plan. (GPG, NSF 01-2, Chapter II.C.3). This section must not exceed 40 pages in length and must contain the following sections, A through N, in the sequence and with the headings shown below. Appendices 1-4 must be included in the proposal and are described in more detail in the section "Appendices" below. For proposals recommended for an award, this project description section, with section A and parts of section D deleted, the appendices, and with revisions incorporated prior to an award being made based on the merit review process, will serve as the baseline Project Execution Plan (PEP). Proposers may be asked to revise the Project Execution Plan prior to an award being made. The PEP documents the technical, schedule, and budget baselines and the strategic and tactical plans necessary to define how the project team will sequence and execute each project phase (design, procurement, contracts, construction, reporting, commissioning, start-up, validation/performance testing, maintenance and operations). **Use SI units only throughout the text.**

Section A. Results from Prior NSF Support (up to 5 pages). If the principal investigator or co-principal investigator(s) have received NSF funding in the past five years, information on prior awards is required. Please consult the GPG for details.

Section B. List of All Project Participants. This list must be complete and include all personnel (except students) who will receive support from the proposal. Group the list by names of the organizations, beginning with the submitting organization; and include all partners, subawardees, and consultants. For each project participant include the name, professional title, department, organizational affiliation, and mailing address. **Do not include the explicit names of External Advisory Committee members in the proposal; proposals that contain explicit names will be returned without review.**

Section C. Technical Scope Baseline. This section, along with Appendix 1, constitutes the technical baseline that project and equipment performance will be referenced against if an award is made. Proposers will be responsible for delivering the completed equipment installation, commissioned and demonstrated to perform at the technical capabilities listed below by September 30, 2004.

C.1) Research and Education Vision. This section should present a compelling research and education vision of the need for the requested NEES equipment, including:

- Next-generation experimental capabilities and instrumentation provided by the NEES equipment.

- Vision for how the seismic design and performance of our Nation's civil and mechanical infrastructure systems will be significantly advanced over the state-of-the-art through integrated experimentation with the NEES equipment, computation, theory, databases, and model-based simulation.

- Three examples of research projects that could be conducted with the NEES equipment to fulfill the research vision.

- Explanation of why the proposed equipment is needed as part of the national NEES infrastructure. This section should specifically address merit review criteria 2: "What are the broader impacts of the proposed activity?" described further in Section VI., Proposal Review Information, of this program solicitation and in the context of what has already been funded in the NEES Phase 1 Equipment Portfolio.

- **C.2). Design Baseline of the NEES Equipment.** This section should provide a complete summary of the technical design baseline of the requested NEES equipment, including:

- List in tabular format of the major design criteria and performance specifications of the equipment that establish the baseline technical specifications for the equipment.

- Summary of the design of the NEES equipment (full details of the design should not be included here, but should be presented in Appendix 1 of the proposal).

- Discussion of the design of teleobservation and teleoperation capabilities, including any modifications needed to the equipment to provide these capabilities.

- Description of specifically how the equipment will be remotely observed and remotely operated.

- Description of a method of time stamping for data streams that are in exact synchronization with the controlled experiments.

- Description of the sensors and instrumentation that will be designed and/or purchased.

For projects involving upgrading of existing equipment, an assessment of the existing condition and operating capabilities of that equipment must be included below in Section D, "Description of Existing Major Earthquake Engineering Research Equipment."

State the specific location where the equipment will be housed, either at the host institution or elsewhere, e.g., for field installations, and how this location will provide physical security for the equipment while also remaining accessible to faculty and students at the host institution and nationally to users outside the host institution. Provide a statement of why the equipment is severable or nonseverable from the facility where it will be housed. Describe in detail any new or improved infrastructure that the university will provide for the proposed equipment and what office(s) at the institution is responsible for these improvements, including schedule, estimation of costs, and actual provision of the funding for these improvements. The host institution and, if necessary, the host site must commit, in letter(s) signed by authorized organizational representative(s), to the identification of specific locations for storage (when applicable) and operation of equipment and sensors/instruments, to the allocation of space and infrastructure on its campus/site for housing and operating the NEES equipment and to providing national, shared-use access to the NEES equipment by the earthquake engineering research community through September 30, 2014. All letters are to be included in Appendix 1. This and other appendices and supporting documents should be placed in the Supplementary Documents section within FastLane.

Section D. Description of Existing Major Earthquake Engineering Research Equipment. Describe any existing major research equipment such as shake tables, centrifuges, wave tanks, large-scale laboratory experimentation systems or field experimentation and monitoring installations, currently used at the host institution for earthquake engineering research and education. For example, describe the equipment, site history, equipment administration, research areas, teleobservation and teleoperation capabilities, access and transportation, automated data acquisition systems, data management, communications, staff, and other items of interest. Information on annual equipment usage and downtime should be included for the past five years. Include pertinent data on revenue from, and cost of, equipment services for the preceding two years, including user charges, salaries of support personnel, maintenance contracts, shop charges and other expenses.

Describe the research and educational use of this major equipment during the past five years: annual number of faculty and student use days; research projects supported and impact of experimental results; courses (both academic and public) conducted; special activities hosted, e.g., workshops and conferences; and number of journal publications, master's theses, and doctoral dissertations that cited use of the equipment. Estimate the number of postdoctorates, graduate students, and undergraduate students whose research and education-related activities have used the equipment for each year of the past five years.

For projects involving upgrading of existing equipment, provide an assessment of the existing condition and operating capabilities of that equipment. Provide the documentation or inspection report that formed the basis for estimating the scope and cost of the proposed upgrade.

Section E. Project Organization and Staffing Plan. Provide a functional organization chart, identifying all members of the *project management team*, including all key personnel. List in tabular format the members of the project management team (including students if funding is requested for them), their roles on the project, the specific activities and deliverables they will be responsible for, the amount of time to be devoted to the project, and their qualifications for their assignments. Include in this list positions to be recruited and filled after an award is made and the target date to fill such positions.

Discuss any *partnerships or teaming arrangements* with research collaborators or equipment suppliers. Describe their participation in the project management team, describe the nature of any contractual or memorandum of understanding agreements involved, and identify the responsibilities for specific individuals involved in project operations (include their curriculum vitae in the "Biographical Sketches" section).

Because of the complexity of NEES as a national, networked, distributed Major Research Equipment program that will serve the broader earthquake engineering research community, an *external advisory committee* **is required** to ensure technical quality, relevance and usability of the NEES equipment provided to the community, and effective synergy with the other NEES program components. Describe the planned makeup (list of disciplines) of the External Advisory Committee and its reporting relationship with the project management team. **Do not include the explicit names of External Advisory Committee members in the proposal; proposals that contain explicit names will be returned without review.** NSF assumes that once an award is made, appropriate personnel will be identified. Although not a requirement of this solicitation, an internal advisory committee or group may also be appropriate for oversight of project operations. Describe plans for establishing such an internal advisory committee or group, if applicable. Identify all such advisory committees on the organization chart.

Section F. Project Management Plan. Provide the Project Management Plan to execute the project, including day-to-day adherence to schedules, decision making (including change control of baselines), fiscal management, communications (internal and external), reporting to NSF, coordination with outside consultants, participation and cooperation with other NEES awardees (Consortium Development awardee, System Integration awardee, and other equipment awardees), and communications with the earthquake engineering community. Describe how the critical path will be considered to govern the actions of the project team.

Section G. Design, Procurement, Construction, Installation and Commissioning. Include the two sections below.

Plans. This section of the proposal should describe all design, procurement, construction and quality assurance activities necessary to complete the proposed equipment installation, defining the basis for cost and project scope (including space, utilities, and communications), including:

- Plan for reviewing and approving the design for the proposed equipment.
- Individual(s), consultants, or others who will be involved in the reviews representing the awardee.

- Design completion stages at which review will take place, e.g., 10%, 30%, and 90% of final design.
- Plan to compete final design, construction and installation.
- Analysis of problems to be overcome.
- Plan for inspection and quality assurance.
- Discussion of the extent of equipment/instrumentation/sensor design engineering to be provided by equipment suppliers and the extent of such design to be performed by the project team. Include discussion of the basis for this strategy.
- Discussion of the extent of planned off-site and on-site fabrication of equipment, and discuss the rationale for the proposed strategy.
- Quality Assurance Plan including, but not be limited to, contractor/supplier auditing, progress assessment, and a contingency process.
- Description of milestone points for evaluation of design, procurement, and construction progress.
- Discussion of the plan for commissioning and performance testing, including personnel who will conduct this phase of the work.
- Discussion of the planned sequence for construction.
- Description of the interface control with tie-ins to existing equipment, structures and utilities.

Experience. Describe pertinent, e.g., similar-scale research equipment, design, procurement, construction, installation, commissioning, quality assurance and management experience at the host institution in the past five years, concentrating on pertinent experience of the members of the management team, in particular the principal investigator and co-principal investigator(s). Discuss the qualification of the equipment design team and its experience with similar designs. Cite major equipment designs and installations by the design team in the past five years. Briefly describe the experience of the equipment suppliers and construction contractors, including those on the project team or who are subawardees or suppliers. Provide details on pertinent projects in the past five years by such vendors and contractors in Appendix 3. Discuss the qualifications of the project team for conducting quality assurance.

Section H. Equipment Management and Operation. Present the management plan for post-construction operation of the proposed equipment installation and of the facility/site where it is located. Include an organization chart for post-construction operations. Include a schedule for operation of the equipment through September 30, 2004. Discuss the organizational structure and identify responsibilities for specific individuals, including technicians, involved in operation (include their curriculum vitae in the "Biographical Sketches" section). Indicate the annual percentage of time to be devoted by each individual to the operation of the NEES equipment. Provide a plan for assessing equipment performance and management through September 30, 2004. If user fees will be charged, list (estimate) the fees and discuss how these fees were established. Provide plans for technical and maintenance staff continuity to 2014.

Section I. Project Schedule with Milestones. This section constitutes the schedule baseline that project performance will be referenced against if an award is made. Provide a detailed project schedule using a Gantt chart (in MS Project 2000 format) depicting all project milestones, major deliverables, tasks and subtasks, including construction. Include milestones associated with establishment of the high performance network at the equipment installation, corresponding to the descriptions provided in Appendix 2. Identify milestone points for evaluation of design, procurement and construction progress. Clearly identify the critical path(s) to on-time project completion. The schedule should extend from October 1, 2002 to September 30, 2004.

Section J. Project Controls Plan. Describe how the project team will perform monitoring, analyzing, statusing and forecasting of project costs and project progress against the baseline technical scope, schedule, and budget. Describe the procedures to be used for early detection and reporting of potential deviations from the baseline technical scope, schedule, and schedule plans. Identify the project team member (see 'Project organization and staffing plan' above) who will be responsible for maintaining and reporting to NSF the schedule status.

Section K. Risk Identification and Mitigation (at least one page in length). Provide a risk identification and mitigation plan for the project, identifying any risks that threaten achieving the technical performance objectives of the project or threaten the successful completion of the project by September 30, 2004. For each threat, describe the strategy and actions to be taken to assess and mitigate the threat, including:

- Source of the risk
- Outcome to the project if the event occurs
- Assessment of the risk in terms of:
    - Probability (3=high, 2=medium, 1=low)
    - Severity (3=high, 2=medium, 1=low)
    - Lack of Control (3=high, 2=medium, 1=low)
    - Overall ranking (sum of probability, severity and lack of control)
- Response to the risk in terms of:
    - Method (Retain, Transfer or Avoid)
    - Actions to be taken consistent with with method to mitigate the risk

Include the risk to the project associated with a delay in NSF making an award until after October 1, 2002 and the steps that would be taken to mitigate such a delay.

Section L. Procurement Approach, Including Performance-Based Payment Schedule Strategy. Provide the plan for re-validating supplier quotation(s) contained in the proposal, if necessary. Indicate whether the quotation(s), which must support the equipment cost estimates, is the result of competitive bidding or a single bid, and the expiration date of the quote(s). Describe the strategy to obtain new quotation(s) or re-validation of existing quotation(s) for procurement purposes should an award be made. If a noncompetitive, sole source award will be made, provide technical and institutional justification for the sole source strategy. Discuss the strategy for employing a performance-based supplier payment schedule tied to progress metrics.

Section M. Information Management. Data derived from NEES equipment must be made widely available in a timely manner. Describe the information management system and standards in current use in earthquake engineering research at the host institution, and the plan for information management during operation of the NEES equipment. Describe how the data management activity will be carried out in the design of research projects, the mechanisms to be employed to ensure that researchers contribute their data to the NEES databases, and the criteria to be used to establish target dates for researchers to release data to the NEES databases. See section below on *NEES Data Requirements* under Part VII.C., Reporting Requirements.

Section N. Education, Training, and Shared Use. Describe plans to integrate experimentation with the NEES equipment into educational activities at the host institution, involving both undergraduate and graduate students. Describe the training that would be needed by potential users of this equipment and the staff who would conduct such training. Describe plans to develop training/user manuals and a website for potential users of this equipment. Estimate the annual percentage of time, through September 30, 2014, that the equipment will be scheduled for research by host institution investigators, shared-use access by researchers outside the host institution, training on equipment usage, and routine maintenance. Provide plans and corresponding budget details for remote and interactive training on use of the equipment. If user fees are involved in the plan for equipment operation through September 30, 2004, describe how the fees will be established.

Proposers should note, however, that training activities and shared-use access will be coordinated by the NEES Consortium Development and NEES Consortium awardees. The Consortium Development awardee will coordinate these activities through September 30, 2004. NEES-wide policies on training, access and fees will be developed and implemented by the NEES Consortium through September 30, 2014.

4. References Cited (GPG, Chapter II.C.4).

5. Biographical Sketches (GPG, Chapter II.C.5). Include biographical sketches (limited to two pages each) of the principal investigator, co-principal investigator(s), technicians, subawardees and consultants, and all other project participants listed in the "List of All Project Participants" above. Provide an additional two-page biographical sketch for each person responsible for the operation and technical support of the proposed equipment installation if that person is not among those identified in the list. Do not include copies of publications or other information.

6. Budget (GPG, Chapter II.C.6). Provide cumulative and annual budgets for the project period through September 30, 2004, including all subaward budgets. Support equipment cost estimates with vendor quotations and include them with the proposal. Quotations must be valid at least to October 1, 2002. The budget justification, which must not exceed three pages, should itemize and explain all project costs assigned to NSF through September 30, 2004. The NSF budget request should identify the costs for design, procurement, construction, installation, commissioning and operation of the requested equipment. The NSF budget request should also include an estimated provision for travel by the principal investigator to two NSF NEES awardee meetings per year through September 30, 2004, and travel costs for an External Advisory Committee. Cost sharing is not required; however, any cost sharing listed on line M of the NSF budget form will be a condition of the award if an award is made. Appendix 4 must contain detailed information for the total cost estimate for the project, which includes costs assigned to NSF and those assigned to all other sources. The budget and detailed information on the costs for site-specific local networking equipment should not be included in the budget estimates assigned to NSF or to any other sources. Rather, these estimated costs are to be included in Appendix 2 as an information item.

7. Current and Pending Support (GPG, Chapter II.C.7). Two types of information on cost support and time obligations must be included in this section. Information on all current and pending support for ongoing projects and proposals from whatever source in the past five years must be listed for support, repair, renovation, replacement, and construction of any existing earthquake engineering equipment requested to be upgraded as well as for existing major earthquake engineering equipment at the host institution. The proposed project and all other projects or activities requiring a portion of time of the PI and other senior personnel must be included, even if they receive no salary support from the project(s). Provide similar information for all proposals already submitted or submitted concurrently to other possible sponsors, including NSF.

8. Facilities, Equipment, and Other Resources (GPG, Chapter II.C.8). Provide a facilities statement as described in GPG, Section II.C.8. Do not duplicate equipment described in Section C, "Description of Existing Major Earthquake Engineering Research Equipment," of the proposal. Make explicit reference to the current location, condition, use, etc., of any related equipment purchased by the host institution under NSF equipment grants in the past five years. Describe other resources, including existing technician positions and their source of funding.

9. Appendices (GPG, Section II.C.10). The proposal must include the four appendices identified below, and not exceed the specified page limit for each appendix. Figures, including charts, graphs, maps, photographs, and other pictorial presentations, are included in the page limit specified for each appendix. A non-conforming proposal will be returned without review.

Appendix 1. Technical Baseline/Conceptual Design (up to 12 pages) and Letter(s) of Commitment from Host Institution, and, if Necessary, Host Site (letter(s) are not included in page limit). Discuss in detail the design and location of the requested equipment. Include a detailed listing of the design criteria and performance specifications for the equipment, including teleobservation and teleoperation, sensors, instrumentation, data acquisition, data management and storage capabilities. Include site plans, floor plans, laboratory infrastructure improvement, and structural design and drawings. Include a discussion of access to the equipment, lay down and test specimen preparation areas, crane capacity and overhead clearance limitations, and related operational issues as applicable. Use SI units only.

If the proposal involves upgrading of existing major equipment, include documentation or inspection report that formed the basis for estimating the scope and cost of the proposed upgrade. This is a more detailed assessment of the current condition of such equipment than provided above in Section C, "Description of Existing Major Earthquake Engineering Research Equipment." Provide a detailed breakdown of the components of any complex equipment. Clearly justify each component. If a specific manufacturer and model has been selected, explain the justification for the sole source selection. If a specific component has not been selected in advance, describe those components that are of interest, their costs, and the methods that will be used to make the final selection. It is appropriate to request multiple pieces of equipment related by a common purpose, but a "shopping list" of unrelated items is not advised. Proposers are encouraged to consider the most cost-effective approach to obtaining equipment that has the capability of teleoperation. Indicate how safety issues have been identified and included in the design and budget where appropriate.

Explain how the goal of minimizing operating costs will be taken into account in the equipment design, selection, and installation. Identify assumptions regarding any major repairs or major maintenance that may be needed to keep the equipment operational through September 30, 2014. Provide plans for long-term maintenance to ensure optimum availability of the proposed equipment through 2014. The host institution and, if necessary, the host site must commit, in letter(s) signed by authorized organizational representative(s), to the allocation of space and infrastructure on its campus/site for housing and operating the NEES equipment and to providing national, shared-use access to the NEES equipment by the earthquake engineering research community through September 30, 2014. These letter(s) of commitment must be included at the end of this appendix, but are not included in the 12-page limit. This and other appendices and supporting documents should be placed in the Supplementary Documents section within FastLane.

Appendix 2. High Performance Local Networking for the NEES System (up to four pages). This appendix requests information and detailed cost estimates for site-specific hardware and software necessary for local networking to achieve the goal of the NEES Program for networking NEES equipment. The purpose of the information requested in this Appendix is to help NSF in determining the extent of need to bring the networking capability of requested NEES equipment sites up to the "reference" networking level described below. Proposers are asked to describe the existing networking environment for the requested NEES equipment, propose what is needed to reach the reference level capability (described below), and estimate the cost of achieving that capability.

Define a "reference" network plan in consideration of planned capabilities approaching near-real-time dissemination of readouts from the equipment instrumentation. The reference plan provides at least Gigabit Ethernet speeds from the equipment through to the host institution's Internet interface. This may be staged; the installation itself may be outfitted for Gigabit Ethernet (1-10 Gb/s) initially to provide growth potential, and the host institution's local area network may be upgraded later, if needed, or bypassed to provide a direct connection from the equipment. Internet access and ancillary equipment should be sized to provide a growth path for information transfer from the expected equipment instrumentation data rates (likely to approach Gigabits/second in some instances) to anticipated Gigabit/second wide area networking by 2004 or shortly thereafter. Therefore, in the reference network plan, the host institution's shared Internet access should initially be at least T3 (45Mb/s), or a private connection directly from the installation to the Internet should initially be at least tens of Mb/s. Gigabit/second access to wide area networking should be achieved by 2004. Initially, over-provisioned networks, such as vBNS, vBNS+ and Abilene, and/or services similar to virtual private networking may be employed to form a community of interest among the NEES community.

Specifically, proposers must provide the following information in this Appendix:

1. Describe the current networking environment available from the requested NEES equipment to the Internet. This includes local networking equipment and the host institution's or host site's access to a high performance network.

2. Describe how the requested equipment will be networked according to the "reference" network plan. Proposals may deviate from the "reference" network plan, but the rationale for doing so must be provided.

3. Provide a cost estimate for upgrading or providing new local networking capabilities for the NEES equipment consistent with the "reference" network plan. For field installations, provide a detailed cost estimate to supply high performance Internet connectivity as close to the "reference" network plan as is reasonable and practical, e.g., wide-area wireless links may be limited to Mb/s or may not be practical in some situations.

4. Do not include the cost of the host institution's or host site's access to a high performance network; this is not an eligible project cost under this solicitation. High performance network access must be provided as a condition of an award.

Appendix 3. Equipment and Construction Contractors Past Experience (up to five pages). Provide documentation of equipment suppliers and construction contractors performance on similar projects in the past five years.

Appendix 4. Total Cost Estimation (up to five pages). Submit a one-page detailed cumulative year budget spreadsheet using the template shown in Table 1. This is in addition to the NSF budget forms. In the left-most column, list the NSF budget categories. The NSF budget categories should be subdivided to provide detailed information for items such as personnel support, equipment components, and subaward information. The next columns should be: amount requested from NSF and from other support, e.g., State appropriations, industry, or other private funds (if any). Use one column for each source of support and identify the source. For requested equipment include actual equipment costs based on supplier quotation(s) not just a nominal quotation (see Budget section 6 above). Identify and include discounts available for the total equipment package requested, itemized by major components. Institutional procurement policies should be pursued as far as feasible before submission of the proposal so that the request can be considered on current and realistic information. Explain the basis for all cost estimates. Include supplier quotations.

Include in this appendix, derived from costs in the above spreadsheet, a table showing both the NSF budget request and the total costs (costs assigned to NSF and all other sources) for the following items: (1) completion of detailed final design; (2) construction, installation, and commissioning; and (3) provision for teleoperation capability.

Finally, in a separate table, list estimated annual total costs for operation of the equipment from the date that the equipment is expected to become operational through September 30, 2014. The annual operating costs should be broken down by the following categories: operator, technician, and other support personnel salaries; maintenance and repair; replacement equipment; materials and supplies; shop charges; consultant services; computer services; and other (itemize).

Table 1. Total Cost Estimation Spreadsheet.

Cost Item	NSF-funded Person-Months				Requested from NSF	Other Support one column for each source of support
A Senior Personnel	Rate	Cal	Acad	Sumr		
B. Other Personnel						
C. Fringe Benefits						
Total Personnel						
D. Equipment						
List by component						
E. Travel						
F. Participant Support						
G. Other Direct Costs						
H. Total Direct Costs						
I. Indirect Costs						
J. Total Direct and Indirect Costs						
Total A-J						

No other attachments or appendix material will be permitted. Proposals that include other appendices or other material, except material specifically permitted in this solicitation, will be returned without review.

Proposers are reminded to identify the program solicitation number (NSF-01-164) in the program announcement/solicitation block on the proposal Cover Sheet (NSF Form 1207). Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost sharing is not required in proposals submitted under this Program Solicitation.

Other Budgetary Limitations: See "Award Information" section of this solicitation.

C. Deadline/Target Dates

Proposals must be submitted by the following date(s):

Letters of Intent (*required*): December 31, 2001
Full Proposals *by 5:00 PM local time*: January 30, 2002

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: http://www.fastlane.nsf.gov/a1/newstan.htm. For FastLane user support, call 1-800-673-6188 or e-mail fastlane@nsf.gov.

Submission of Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane website at: http://www.fastlane.nsf.gov.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

Proposals will be reviewed against the following general review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal and for which he/she is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Principal Investigators should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both of the above-described NSF merit review criteria. NSF staff will give these elements careful consideration in making funding decisions.

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria

In addition to the standard NSF Merit Review Criteria, reviewers will be asked to address the following merit review criteria:

Vision and Impact

1. How well does the requested equipment provide unique, innovative, next-generation experimental research capabilities and instrumentation that extends or complements the capabilities of the portfolio of existing experimental earthquake engineering research equipment in the United States and the equipment awarded by NSF under NEES Equipment Phase 1?

2. How compelling is the research vision for integrated experimentation with the requested NEES equipment, computation, theory, databases, and model-based simulation that can lead to significant advances in the seismic design and performance of our Nation’s civil and mechanical infrastructure systems?

3. How well does the proposed equipment and plan of operation facilitate shared-use of equipment and collaborative research?

4. How well does the host institution provide for a comprehensive evaluation of needed user and training manuals, website, and sufficient annual equipment time for training purposes on the use of the equipment for researchers outside the host institution?

Equipment

1. Is the design well-conceived? Are the equipment and equipment component choices appropriate to meeting the functional performance objectives, including teleobservation and teleoperation? Are design criteria and performance specifications adequately addressed?

2. Has an appropriate and permanent location been selected for housing the equipment and is this documented in a letter from the host institution or host site?

Budget

1. Is the budget appropriate for the scope of work and equipment proposed, including cost of construction and associated infrastructure upgrades? Are all personnel costs adequately justified?

Project Execution

1. Does the host institution and the principal investigator, co-principal investigators, and other project personnel have the appropriate experience, capability, and commitment to manage this project in terms of the equipment design, procurement, construction, installation, commissioning, reporting, operation, shared-use access, teleobservation, teleoperation, and training and to conduct the proposed research once the equipment is operational?

2. Does the proposal contain a realistic Project Execution Plan, including a detailed schedule with milestones and critical path, management plan, organization, risk management plan, advisory committees, project controls plan and procurement approach over the duration of the project to ensure completion of construction and commissioning by September 30, 2004?

3. Is there adequate commitment(s) from the host institution and, if necessary, the host site to allocate space and infrastructure on its campus/site for housing and operating the NEES equipment and to providing national, shared-use access to the NEES equipment by the earthquake engineering research community through September 30, 2014?

4. Is there demonstrated evidence of quality work from previous NSF awards (if applicable) over the past five years?

NEES Proposal Review

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this solicitation will be reviewed by panels, but ad hoc mail reviews may also be used. Reviewers will include experts from the earthquake engineering community, construction industry, and other appropriate fields.

NEES Technical Review Panel and Required PI Participation

Proposals will first be reviewed by one or more Equipment Technical Review Panel(s) who will consider all proposals submitted and prepare recommendations of proposals to be considered further. NSF/CMS staff will review these recommendations and select a short-list of proposals to be considered further by an Equipment Portfolio Review Panel. The principal investigator(s) who make the short-list for proposal consideration will be required to brief the Equipment Portfolio Review Panel in person at NSF headquarters in Arlington, Virginia. Briefing participants will be advised as such in April-May 2002 and given a specific date and time window in May 2002 for the briefing to take place. Principal investigators should plan their schedules during this period to be available for this part of the proposal merit review process. Dates will not be rescheduled. Travel and other costs will be the responsibility of proposers.

A summary rating and accompanying narrative will be completed and signed by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Mail and/or panel review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 70 percent of proposals. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at its own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1)* or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at http://www.nsf.gov/cgi-bin/getpub?gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at http://www.gpo.gov.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Awardees will be required to report on award performance milestones as specified in the cooperative agreement and to document and report annual operating costs through September 30, 2004.

During the project period, in addition to an annual project progress report, the awardee will be required to establish a project website and to submit Quarterly Interim Progress Reports, and Government Performance and Results Act (GPRA) Performance Data Reports. In addition the awardee will be required to submit a Requirements Document for the project which must be updated by the awardee annually as needed. The format for these reports will be provided by NSF within one month of the award date. Awardees will also be required to maintain a current Project Execution Plan and submit timely revisions, as needed, to NSF.

NEES Data Requirements - As a general policy, NSF will require submission of NEES-related NSF-supported data, derived data products, samples, physical collections, and other supported materials to the NEES research data center and other specified repositories. NSF expects investigators to share data and information on experiments with other researchers at no more than incremental cost and within a reasonable time. Investigators should be prepared to work with the NEES System Integration awardee, the NEES Consortium Development awardee, the NEES Consortium awardee, and the other NEES equipment (Phase 1 and 2) awardees to establish standards and to require application of such standards for collecting, processing and communicating of NSF-sponsored data sets.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding NEES Earthquake Engineering Research Equipment, Phase 2 should be made to:

- Dr. Joy M. Pauschke, George E. Brown, Jr. Network for Earthquake Engineering Simulation, Program Director, Engineering (ENG), Civil and Mechanical Systems (CMS), Room 545, telephone: (703) 292-7024, e-mail: nees@nsf.gov.
- Dr. Thomas L. Anderson, George E. Brown, Jr. Network for Earthquake Engineering Simulation, Program Director and NEES Equipment Project Coordinator, Engineering (ENG), Civil and Mechanical Systems (CMS), Room 545, telephone: (703) 292-4477, e-mail: nees@nsf.gov.

For questions related to the use of FastLane, contact:

- Kimberly Bryant, NEES Fastlane Coordinator, ENG/CMS, Division of Civil and Mechanical Systems (CMS), Room 545, telephone: (703) 292-7006, e-mail: kbryant@nsf.gov.
- FastLane User Support, IRM/DIS, Division of Information Services, telephone: 800-673-6188, e-mail: fastlane@nsf.gov.

To ensure that all proposers receive the same information, all questions concerning this solicitation, except for those related to FastLane, will be accepted only by e-mail. Please e-mail questions to nees@nsf.gov and include in the heading "NEES EQUIPMENT PHASE 2." All questions, except for those related to FastLane, must be received at NSF by November 30, 2001. NSF will post the responses of interest to all proposers on the NSF NEES FAQ website at: http://www.eng.nsf.gov/nees.

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at http://www.nsf.gov/cgi-bin/getpub?gp. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF E-Bulletin, which is updated daily on the NSF web site at http://www.nsf.gov/home/ebulletin, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's Custom News Service (http://www.nsf.gov/home/cns/start.htm) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Information Dissemination Branch, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

OMB control number: 3145-0058.